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# THE RAYON INDUSTRY IN THE UNITED STATES

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Production of rayon in the United States in 1931 exceeded imports of raw silk by 55,000,000 pounds in spite of the fact that silk imports have shown a rather steady increase for many years.[1] Beginning its initial production in the United States in 1911 with an output of 300,000 pounds of yarn, at a time when the rayon industry was fairly well established in Europe, the American industry has grown rapidly and by 1921 exceeded the production of the foremost producing European countries, England and Germany.[2] The phenomenal growth of this industry since 1918 is even more astonishing when it is noticed that during most of this period of expansion imports of foreign-manufactured rayon have steadily increased while prices a pound have as steadily decreased.[3]

## LOCATION

The production of rayon is now centered in the South with plants operating in Delaware, Maryland, North Carolina, Virginia, Tennessee, West Virginia and Georgia. Altho New England, the Middle Atlantic States and Ohio have some rayon manufacture, the greatest construction has been in the Southern States where a dozen new plants were completed in 1930.[4]

The chief factors influencing location are soft water, labor, and nearness to market, while a fourth factor, source of raw materials, hinges upon abundance of supply, and not so much upon distance, in the case of the United States.

[1] Silk imports decreased in 1930, but showed a decided increase in 1931.

[2] England started manufacturing rayon in 1906; France in 1905; Germany in 1899; Italy in 1909; Belgium in 1900; Holland in 1911; Japan in 1913. Schober: Silk and the Silk Industry, pp. 146-163.

[3] See accompanying graf for rayon prices.

[4] Bluebook of Southern Progress, 1930. pp. 78-79.

From New England to Alabama stretches a tier of states in which soft water predominates; this tier of soft water states also contains a mammoth textile-manufacturing industry; south of the Pennsylvania state line is an abundant supply of labor to be drawn from an agricultural region; in the Southern States is one raw

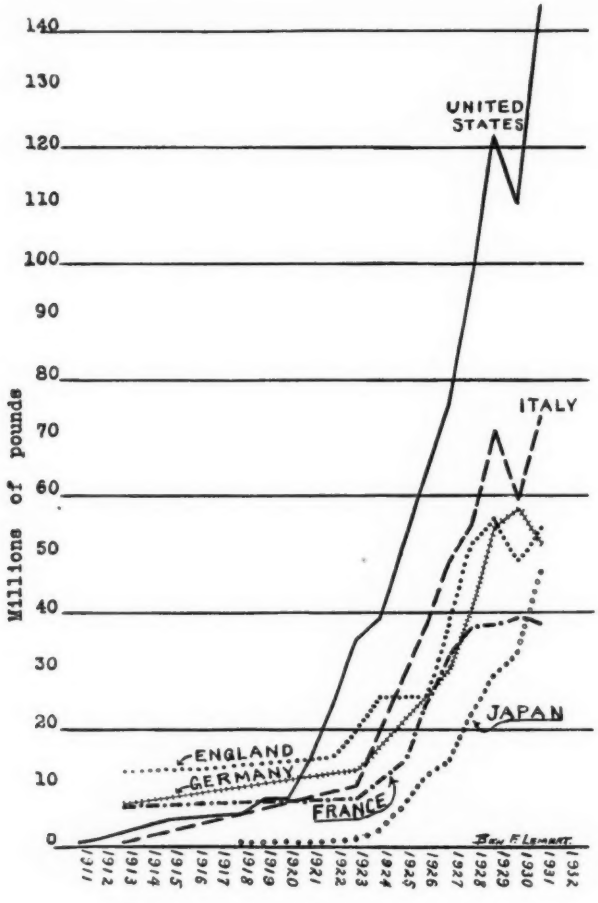


FIG. 1. World Production of Rayon

material—cotton, while in the North and in Canada are the great spruce forests from which come the other raw material—sulphite paper. Modern trunk-line railroads bring the raw materials to the factories cheaply, and the raw materials constitute a very small item of expense in this type of manufacturing. The same railway systems distribute the manufactured products to nearby textile plants, affording efficient and cheap distribution.

## REASONS FOR RAPID GROWTH

Geographic and economic factors favor the establishment of the rayon industry in the United States, but changing social conditions have insured its growth. In the last twenty or thirty years, and particularly in the last ten years, fashions have swung over toward everything made of silk. That which was formerly a luxury, has become an article of everyday use. Thick clothing has given

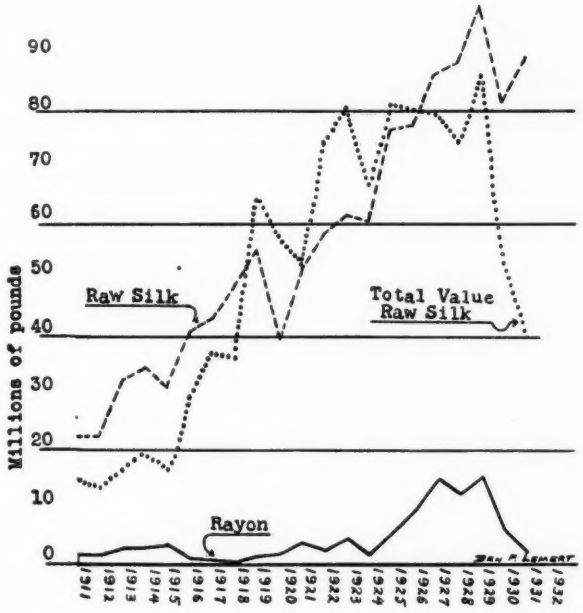


FIG. 2. United States imports of rayon and raw silk

way to light, filmy garments. Dresses, hats, stockings, shirts, underwear and many other items of clothing are made of silk. Those who cannot afford the price of pure silk, constitute a great market for substitutes. In respect to purchasing power the population of a country represents a pyramid with a broad base. The demand for a new fibre satisfying the strata of the market nearer the base will have an opportunity to expand more rapidly than that for a fibre supplying the higher levels. Altho the disadvantages of rayon offset to a considerable extent its price advantage, during the past few years the quality differential has been gradually narrowed and the price differential increased. The demand for the fibre, as it has been made available to wider markets in the pyramid, has in-

creased enormously, and has been readily supplied by an industry whose unit cost of production, excluding the heavy expenditures for laboratory work designed to improve the fibre still further, tends to decline with increased output.[5] Hence the building of new factories and the enlarging of the older plants in spite of the fact that rayon imports showed a steady increase between 1920 and 1929.

For twenty years the rayon industry of the United States has continued to expand, and was one of the last among the textile industries of the United States to show the effects of the present depression. In 1930 the rayon industry of the United States received the first setback during its history, when production dropped from 122,000,000 pounds in 1929 to 110,000,000 pounds in 1930, with a proportionate drop in imports of foreign-made rayons. However, 1931 shows a great increase over previous years, while imports continue to dwindle. Statistics for future years will show whether this means the United States manufacturers are nearing the point where they can supply the home market.

## THE USES OF RAYON

In New York and Pennsylvania, and southwestward thru the Southern Appalachian Piedmont are many knitting mills turning out stockings, socks, underwear, shawls, capes, and other articles into which rayon enters wholly or in part. In 1931, 32 per cent of the rayon production went into underwear, 14 per cent into hosiery, while one per cent made up part of other knit-goods. The woolen mills of the United States use very little rayon, the amount having been one per cent of the total rayon production in 1931. The cotton textile industry, centered in the Southern Appalachian Piedmont, and in New England, mixed 27 per cent of the 1931 rayon production with its fabrics, while the silk industry of Pennsylvania, New Jersey and New York consumed 17 per cent. The remaining 8 per cent of the production for that year entered into miscellaneous manufacturing processes.[6]

Most of the articles, of which rayon is a part, are consumed by the domestic market, tho large quantities are sold abroad. Men's rayon hose go to Canada, women's to Cuba, while considerable

[5] Trends in the Foreign Trade of the United States, National Industrial Conference Board, May, 1930, pp. 207.

[6] U. S. Dept. of Commerce, Spec. Bull. No. 623, Feb. 1932.

amounts of both types find their way to the Philippine Islands, Panama, and Colombia. It is interesting to note that our silk manufactures exports embrace such countries as the United Kingdom, Argentina, Australia, South Africa, and Uruguay.[7]

## THE TYPES OF RAYON PRODUCED

From a process of experimentation dating back to 1664, four types of rayon have evolved, these four types being distinguished

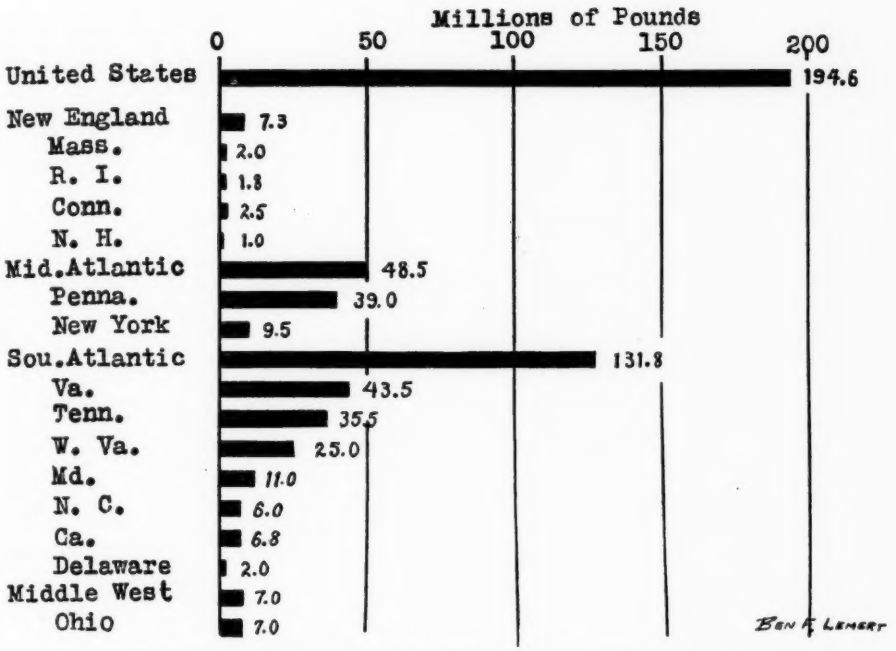


FIG. 3. The productive capacity of the United States rayon industry in 1931

according to the method of manufacture, as nitro, acetate, cuprammonium, and viscose. The nitro silk uses as its raw material, cotton linters; the acetate silk uses either cotton or the best of wood pulp; the cuprammonium uses cotton, while viscose depends upon wood pulp alone.

Nitro silk, the oldest variety, seems to be disappearing from the market because of its small tensile strength. Cuprammonium silk can be spun in very fine counts, but it, likewise, lacks tensile strength and extensibility. Acetate silk has come into use only in the last few years, and while it is the most useful kind due to its

[7] U. S. Stat. Abstract, 1930, page 507.

tensile strength and resistance to water, its cost of production and difficulty and expense of dyeing, limit its manufacture.

Viscose is the most commonly used type of rayon thruout the world, tho the most recently discovered. Its cost of production, lustre, and tensile strength occupy an intermediate position as regards the other types, and new methods of manufacture are continually improving its qualities.[8]

## RANK OF RAYON AMONG THE TEXTILE FIBRES

Since 1921, rayon has exceeded real silk in volume of production, yet both industries seem to be progressing with minimum interference. The United States, tho the greatest producer of rayon, imported $427,000,000 worth of real silk in 1929, more than ever before. At the same time that production of cotton, wool and silk was increasing, the volume of rayon manufacture was showing enormous gains year after year. The total volume of rayon produced in 1929 constituted but 5.1 per cent of the raw materials used in the world's textile industries. However, its percentage in 1925 was but 1.2 per cent.[9] Figures for 1931 will show further increase in percentage.

[8] The world output of rayon is divided as follows:

| | |
|---|---|
| Viscose | 88.0 per cent |
| Nitro silk | 7.5 per cent |
| Acetate silk | 3.0 per cent |
| Cuprammonium | 1.5 per cent |

Schober: Silk and the Silk Industry, 1930. pp. 143.

Eighty-eight per cent of the 440,000,000 pounds of rayon making up the world production of rayon in 1929, consisted of viscose. This process of manufacturing is a chemical industry from the time the sheets of sulphite paper are placed in the sodium hydroxide solution until the silk-like threads emerge to be wound upon the spools. After soaking in the sodium hydroxide the material known as alkali cellulose, is ground and aged, then further dissolved in a solution of carbon disulphide from which it emerges in a form known as cellulose xanthate. Further solution in caustic soda results in a molasses-like liquid called viscose. The viscose is filtered and forced thru fine gold nozzles into a solution of sulphuric acid which strips off everything except the cellulose cells which form the thread. From this point the industry becomes a spinning industry similar to that seen in silk mills.

[9] Percentage of total production.

| *Cotton* | | *Wool* | | *Real Silk* | | *Artificial Silk* | |
|---|---|---|---|---|---|---|---|
| *1925* | *1929* | *1925* | *1929* | *1925* | *1929* | *1925* | *1929* |
| 80.3 | 74.3 | 17.9 | 19.9 | 0.6 | 0.7 | 1.2 | 5.1 |

Schober: Silk and the Silk Industry, 1930. p. 145.

The rayon production of the United States, 144,350,000 pounds in 1931, is only equal to 288,700 bales of cotton, yet that production would be enough to displace over one-third of the cotton farmers of North Carolina, and with continued improvement, the limit to rayon production is rather vague.

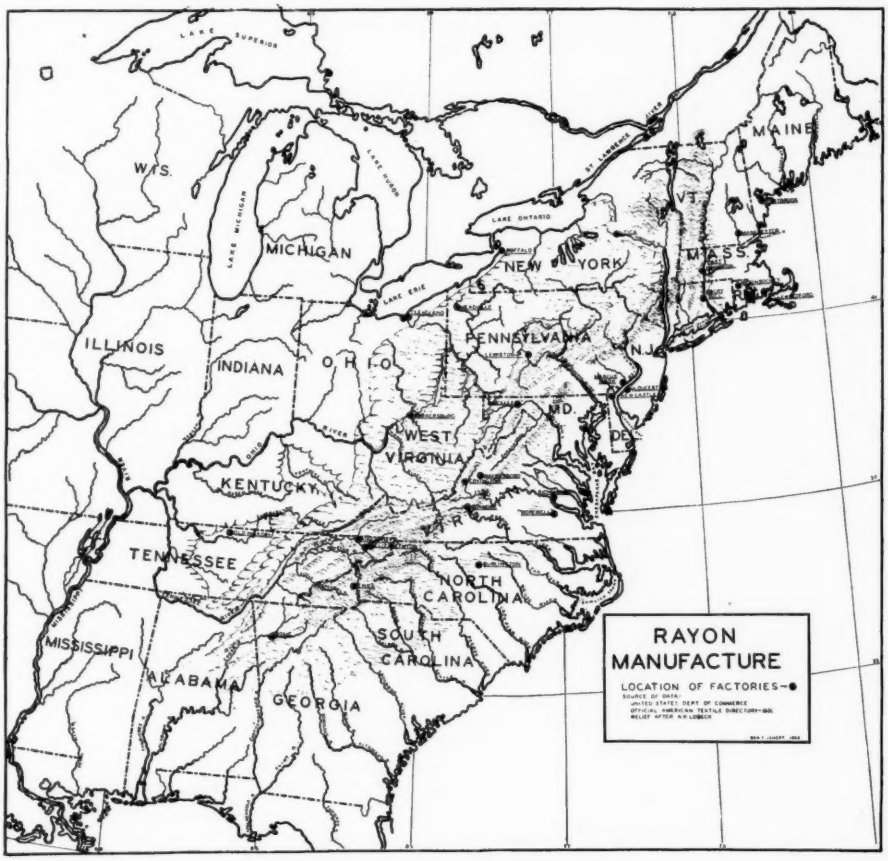


FIG. 4. Rayon manufacturing centers

By means of a recently announced process worked out by two University of North Carolina chemists, the whole cotton plant may be cut and converted into cellulose. If this process is adopted by manufacturers, with Southern farmers raising hundreds of acres of cotton and cutting it with machines, the effect upon Southern farm prosperity, tenantry, and agricultural labor might be revolutionary, indeed.

## UNITED STATES PRODUCTION VERSUS FOREIGN

The chief rayon producers, after the United States, are Italy, England, Germany, Japan, France, and Holland, in the order named, while small amounts are produced in Belgium, Switzerland, Canada and Austria. Production of all other countries amounted to but 2,750,000 pounds in 1931.

The United States has the advantage of raw materials in its cotton belt and the northern timber lands. However, it is importing considerable Norway pine and fir for rayon manufacture due to the fact that American timber contains an excessive amount of pitch and turpentine.[10] The European countries import their wood pulp from the Scandinavian countries, and cotton from the world's cotton-producing areas. Japan lacks woodpulp, and is trying to solve its problem with two native woods, Kara Matsu and Ezo Matsu, similar to white cedar.

Japan has the advantage as far as hours of labor and wages are concerned. The following table shows the comparative advantages between the various countries:

| *Countries* | *Working Day* | *Rates of Pay a Day* |
|---|---|---|
| England | 8 hours | $1.2 |
| United States | 8 hours | 1.9 |
| Germany | 8 hours | 1.1 |
| Italy | 9 hours | 0.86 |
| Japan | 12 hours | 0.53 |

From these figures it is apparent that the advantage is with Japan, yet Italy is not far behind, not only in the matter of hours and rate of pay, but because the intelligence and performance of the Italian laborer rank high while at the same time his standard of living is much lower than that of the American, Englishman, or German.[11]

With reference to skill, the American laborer stands at the top. Most of the American rayon is produced in the Southern Appalachians, the Allegheny and Cumberland Plateaus and the Piedmont. American rayon manufacturers, like the cotton-goods industry, knit-goods industry and the increasing silk-goods industry of the South, located in agricultural regions. Men and women left their hillside farms, and came out of their mountain valleys to work in

[10] Hearings, Vol. XII, Schedule 12, "Silk and Manufactures of," Tariff Readjustment, Washington, D.C., 1929, p. 6576.

[11] Schober: Silk and the Silk Industry, 1930. pp. 147-153.

the rayon mills. Agricultural workers, who had already proven their ability to handle cotton threads, and run full-fashioned silk hosiery knitting machines, were quick at learning the finer rayon processes. Foreign managers of American rayon plants rate Ameri-

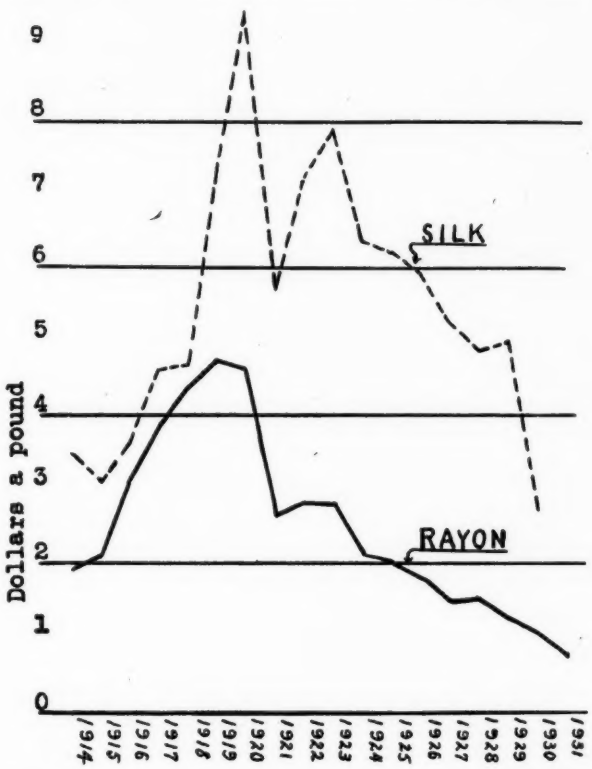


FIG. 5. Average annual price a pound for rayon and raw silk in New York

can labor as much superior to that found in their older European factories.[12]

## THE MARKET

The United States far exceeds the other producing countries with respect to market. Its 123,000,000 people, with their higher wages and higher standard of living, constitute the world's greatest

[12] The South, Anne O'Hare McCormick, *New York Times*, June 15, 1930. "A German office manager in the Bemberg plant, Elizabethton, Tenn., said: 'In Germany few develop such skill. I have never seen workers as quick as these. Two weeks from the plow, tho they have never seen a machine and they can run anything.' "

Note: The manager of the Enka plant, Enka, N.C., made a similar statement to the author of this paper.

market for rayon. The extent of this market is shown by the fact that rayon imports in 1929 amounted to 15,000,000 pounds while exports were as yet insignificant, amounting to but 345,000 pounds in 1930, and 314,000 pounds in 1931. Germany is the only other large rayon-importing country, its imports amounting to 20,647,000

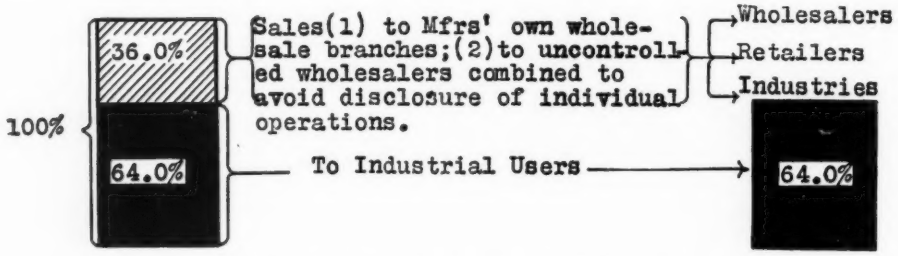


FIG. 6. Distribution of sales of manufacturers of rayon yarn and allied products, 1929. One and eight-tenths per cent of total sales made thru manufacturers' agents, selling agents, brokers, and commission houses.

pounds while its exports totalled 19,800,000 pounds in 1927. Italy, France, Germany, and Holland are the chief contributors to American imports, shipping more than 14,000,000 pounds to the United States in 1927.[13] The distribution of American rayon yarn is shown in Fig. 6.

## TRENDS IN THE RAYON INDUSTRY

As to the future development of the rayon industry, the National Industrial Conference Board sums up the situation as follows: "A true statistical picture would show not only the declining prices of a given grade of rayon but also the introduction on the market, from time to time, of superior and more expensive qualities, and a shift in the bulk of consumption from the original grades to the higher, that is, from the 300 denier ten years ago to the 150 denier at present. The improvement in quality of rayon fibre is a laboratory problem. Remarkable strides have been made in the past, and the heavy investment of the producers in laboratory work connected with the industry indicates their confidence in the possibility of further advance. Every step in improvement of the fibre, as distinct from reduction in price, tends to bring it more and more into the upper strata of the market. Future progress, however, may not be so rapid, since the obstacles to further improvement at present

[13] Schober: Silk and the Silk Industry, 1930, pp. 147-153.

appear to be greater than those already overcome, and since advance is attended by heavier costs.

"To be measured against such rise in quality and reduction in price of rayon are the prospects for reduction in price and further improvement of natural silk, serving to win for silk the lower and broader strata of the market. The perfecting of the automatic reel in the silk industry will be an important step in the direction of lower costs, and further economies in the various stages of sericulture may be found possible.

"The outcome of these prospective developments in silk production, on the one hand, and in rayon, on the other, can not at this time even be guessed."[14]

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## FORESTS AND FOREST ACTIVITIES IN SWEDEN

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Columbia University

The evolution of rational forestry in Sweden constitutes one of the most interesting chapters in the economic development of the country and serves as an excellent illustration of man's adaptation to his environment and of his endeavors to utilize it to the fullest extent. Both the climate and the soil of large parts of Sweden are such that forest growth is the only type of vegetation that will yield worth-while returns. As a result forestry has been developed to a very high level which, if maintained, will safeguard for future generations that part of the national income which may be derived from the forests.

According to a survey made for the purpose of obtaining assessment data and completed in 1930, the forest bearing area of Sweden is 57,300,000 acres, which is about 12 per cent of that of the United States. The total supply of standing timber, exclusive of bark, may be estimated at 50,062,000,000 cubic feet. Of this total, 40 per cent is pine, 42 per cent spruce, and 18 per cent hardwood. The annual regrowth is estimated at 1,683,000,000 cubic feet, divided as follows: 38 per cent pine, 42 per cent spruce, and 20 per cent hardwood. The annual cutting varies from year to year with the general business conditions, but if a sufficiently long period

[14] Trends in the Foreign Trade of the United States, National Industrial Conference Board, 1930. p. 207-08.

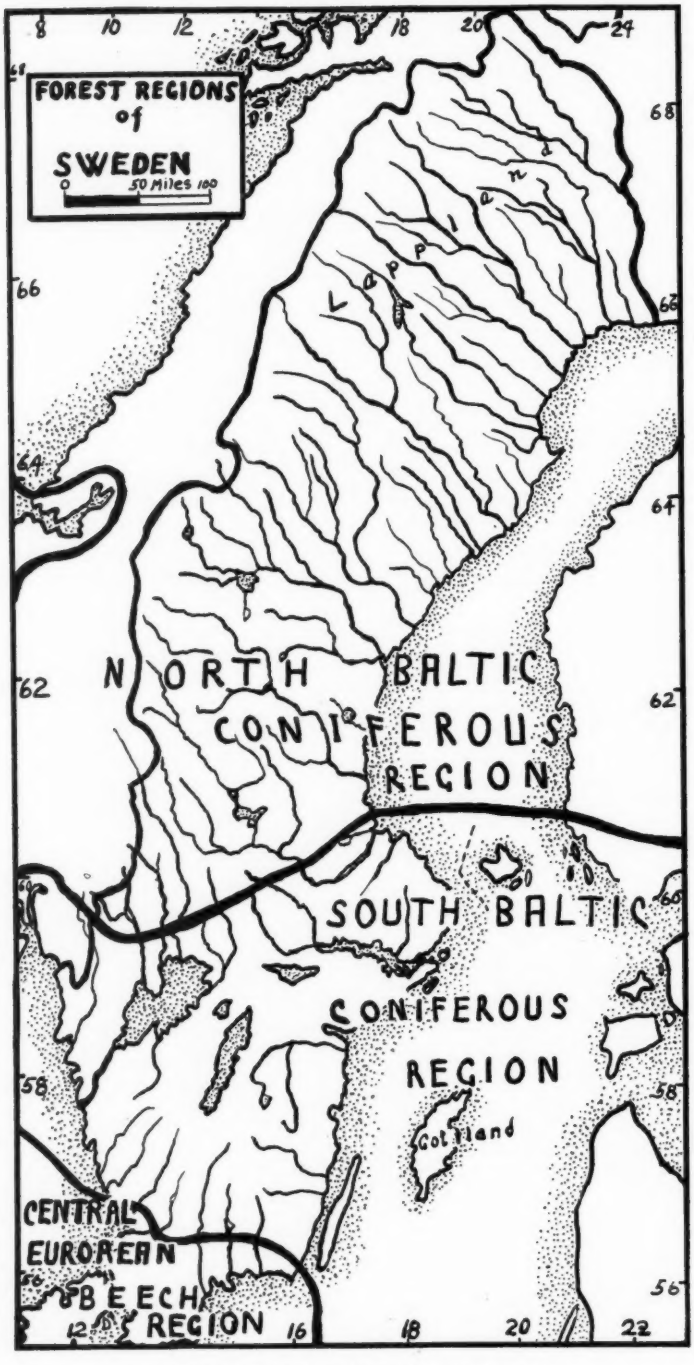


FIG. 1. Forest regions of Scandinavia

is considered it can be said that the present rate of cutting approximates that of regrowth. The yearly losses due to forest fires are not important, the average being about ten thousand acres. The precipitation thruout the year, the absence of underbrush and the fire patrol systems are factors that seem to prevent the occurrence of disastrous forest fires.

## FOREST REGIONS

Even a very cursory glance at the map draws one's attention to the elongated shape of the country, stretching north and south. This fact naturally entails a marked difference in climate between the northern and the southern parts of the country, a difference which in turn is reflected in the character of the forests of the various sections, making possible a division of the country into three rather distinct forest regions.

The north Baltic coniferous region, which includes practically all of Norrland and the Province of Dalecarlia, was the last to be exploited for forest products. In the northern section of this region practically nothing was cut prior to 1830; consequently, stands of virgin forests are still to be found. In the southern part, where mining was developed almost eight centuries ago, large quantities of charcoal were used for the smelting of ore and in places considerable inroads were made into the timber supply. At the present time the greater part of the privately owned forests has been exploited and the stands of virgin forests in private ownership are very few. Less developed are the government forests which occupy extensive areas. In these forests there are many over-mature stands in the more inaccessible interior districts, where satisfactory floating facilities are lacking. The coniferous trees are of two species: pine (*Pinus sylvestris*) and spruce (*Picea excelsa*). Both pine and spruce grow in clear and mixed stands. Pine predominates in most sections, but there are also extensive clear stands of spruce in various parts of the region and several birch forests on the slopes of the Kölen mountains which form the national boundary line between Sweden and Norway. Since the growth of the birch in this very mountainous region is scrubby, the stands scattered and logging facilities generally unsatisfactory, the birch plays an insignificant rôle; its primary use is for fuel for local consumption. In addition there are in this region a few other broadleafed species, such as aspen and alder, but the stands are usually too scattered to make large scale logging profitable.

The south Baltic coniferous region, which includes all the territory south of the north Baltic coniferous region with the exception of the southernmost part of the country, contains primarily pine and spruce, especially in the interior plateau. There are also small stands of oak (*Quercus robur*), ash (*Fraxinus excelsior*), elm (*Ulmus montana*), and birch (*Betula alba*). Excepting limited areas on government-owned forest lands, this region has no virgin forests. Its proximity to relatively densely populated sections of the country has made for an early and intensive exploitation.

The limited forests of the extreme south of Sweden are a part of the central European beech region and contain, as the name of the region implies, largely beech (*Fagus sylvatica*). Some stands of oak, pine, and spruce are also found, but their importance is slight. The present forests are largely planted. The early ones were cut in the Middle Ages when the Hanseatic League held sway in these parts. By that time the forests of western continental Europe had been practically cut out and the forests of southern Sweden afforded the best new source of supply. The oak especially was sought for ship timber, but other prevailing kinds, notably pine, were also cut in large quantities. Accidentally or intentionally in clearing the land for agricultural purposes, considerable areas were burned over, many of which have not yet been reforested. On the whole the southernmost provinces have a sparse forest growth; they are primarily agricultural and possess, in fact, a dairy industry that is practically as intensive as that of Denmark.

## REFORESTATION

Reproduction of the Swedish forests is effected both by the natural process and by planting and seeding. Natural reforestation is practiced by leaving seed trees on otherwise clean cut areas. Considerable importance is attached to improvement thinning; defective trees and the weaker ones of those which stand too close together are removed. In well managed forests this type of cutting is repeated at regular ten year intervals. Planting is practiced both where much thinning has taken place and on clear cut blocks laid out in the forests.

In recent years the increasing demand for spruce wood created by the growing pulp industry has placed emphasis upon the planting of spruce. The fact that the spruce is a sturdy tree that grows rapidly under pine has no doubt also influenced the trend. The

planting is done under the supervision of the Forest Conservation Board of the province and usually by persons who have studied forestry as a vocation. In some of the rural districts the school children are given an opportunity to participate in reforestation work. The children are given a day off from school and are brought out to the forest where they may take part in the actual planting under the supervision of the foresters of the Forest Service who travel from place to place during the planting season. The undertaking is an endeavor to instill a "forest-consciousness" in the minds of the children, and it may be said to have met with at least some success.

## FOREST LEGISLATION

The Swedes early realized the danger of overcutting and took measures to prevent it. There were attempts in this direction already in 1647, but a definite movement toward a rational forest policy appeared first in 1869 with the passing of a law against excessive cutting on the island of Gottland. It was characteristic of the early forest laws to be applicable only to certain specific provinces or sections of the country. The result was that in some sections the forests were cut in excess of annual growth, while in others well preserved forests were retained. One of the most important of these special measures is the Lappmarken Law, passed in 1873 and applicable to the Lappmarken district. Its main features are that all trees cut for sale must be marked by the government forester and that the forests shall be managed along lines approved by the officers of the Forest Service. This law has resulted in a relatively well preserved supply of timber in this district; in fact, in recent years complaints have been made to the effect that the law is too restrictive and its enforcement not conducive to the very best utilization of the forests. The most important measure of the last decade is the Forest Conservation Act of 1923 which is applicable to the entire country. It provides that stands of pine and spruce may not be cut beyond the thinning necessary for their development. If, however, the forest owner should need lumber for his own household use, he may obtain permission from the conservation board of his district to cut what is deemed necessary. Violators of the law are liable to heavy fines and confiscation of the timber that has been illegally cut.

## LOGGING

In the past the production of lumber predominated and the export articles were largely boards, beams and props for the English mines, but in recent years large quantities of pulp and paper have been shipped, some of which went to the United States. The pulp production increased almost 100 per cent during the last fifteen years. Sweden furnishes about 20 per cent of the world's

FIG. 2. Timber placed on the ice ready to move when the river opens in the spring (Courtesy, Swedish State Railways)

production of chemical pulp and is the leading exporter of this commodity, supplying about 40 per cent of the total that enters into the world's foreign trade. With regard to mechanical pulp Sweden produces nearly 10 per cent of the world's total and its exports account for about one-third of that entering international trade. The value of the Swedish exports of forest products has in some years reached approximately $200,000,000. More than 75 per cent of the quantities that this sum represents have their origin

in the northern part of the country where the large scale forest operations for which Sweden has become known are carried on. Considerable quantities are also produced in central and southern Sweden, but the local industries of these regions absorb the greater part of the output, so that the volume of export is relatively small. The following discussion of logging and floating of timber is therefore applicable primarily to those parts of the country which fall within the north Baltic coniferous region.

Few mills rely entirely upon their own forests for the supply of logs that they need. The great majority of the sawmills acquire additional logs from the government or the privately owned forests. It has been estimated that about 30 or 40 per cent of the logs used by the export mills are taken from their own mills and the remainder is purchased from outside sources. Many individual forest owners, and in certain cases also the government, cut their own logs and sell them delivered on the banks of the various rivers on which they later are floated down to the purchasing mills. In other cases the timber is sold standing and the mills undertake the logging.

In order to avoid discoloring of the logs, logging is restricted to the winter months. The season begins in November or December, or as soon as the ground is frozen and the first snow has fallen, and lasts three or four months in the south central provinces and six or seven months in northern Sweden. In southern Sweden the snow cover is usually too light or of too short duration for efficient logging, but in central Sweden and Norrland a snow cover of three to six feet remaining thruout the winter greatly facilitates the transportation of the logs from the place of cutting to the river banks. On the south central plateau the logs are brought to the railroad lines, as most of the rivers in this region are unsuitable for floating.

The logging operations are either carried on by the sawmill companies themselves or let out on contract to individuals, who hire their own crews and furnish the necessary equipment. The large forest owners have endeavored to secure permanent staffs of employees in the forests by allowing them, gratis or for a nominal sum, to occupy farms located in the forests, on the condition that they pledge themselves to work for the company during the logging season at the standard wage rate which prevails in the district. There are also many independent farmers who work in

the forests during the winter months, thereby augmenting the income that they derive from the summer's work on the farm. In addition to these relatively permanent lumberjacks, many migratory workers arrive every fall from other parts of Sweden and from Finland to find employment in the forests.

The logs are generally assembled at one or several central points along the main logging road. The hauling from the stump to the assembling point is done on a small sleigh on which the larger end of the log is chained, while the remainder is allowed to drag on the snow. The transportation from the assembling point to the river is also done by means of horses and sleighs. At the waterways the logs are piled on a foundation of two parallel logs placed at right angles to the other logs either on the ice or on the bank of the river. In the northernmost part of Sweden, the reindeer is at times used for hauling logs; but possessing only about half the strength of a horse and much less endurance, he is not used very extensively for this purpose. The only advantage in the use of the reindeer seems to be that the feed problem is negligible, as he is accustomed to find his sustenance by himself. Sometimes a forest owner hires a herd of reindeer to trample the logging roads after a snowfall, which is a very convenient and inexpensive way of clearing roads.

## FLOATING

Floating conditions in Sweden are exceptionally good and are said to surpass those of any other country. Numerous rivers and lakes offer splendid opportunities for relatively easy and inexpensive transportation of timber from the forests to the mills and the shipping points by the sea. Because of the natural advantages of the country, timber has been floated in Sweden since the latter part of the fourteenth century. During the earlier period floating was carried on by individual log owners, but today about 70 per cent of the floating is managed by floating associations made up of interested log owners. These associations do not aim at making money and reserves are seldom built up; after the season's expenses have been paid the profit is distributed among the members. As an economic activity floating is generally looked upon from the point of view of public welfare and the governmental agencies often consider it on a par with the means of transportation and communication. Large amounts of money have been spent on the improvements of the waterways in order to increase their capacity for

floating. The larger portion of this work has been done by private concerns at a total outlay of close to $50,000,000. The government's part in these undertakings has chiefly been of a legislative nature, making it unlawful for property owners along the rivers to interfere with the floating activities of the log owners. Due to these

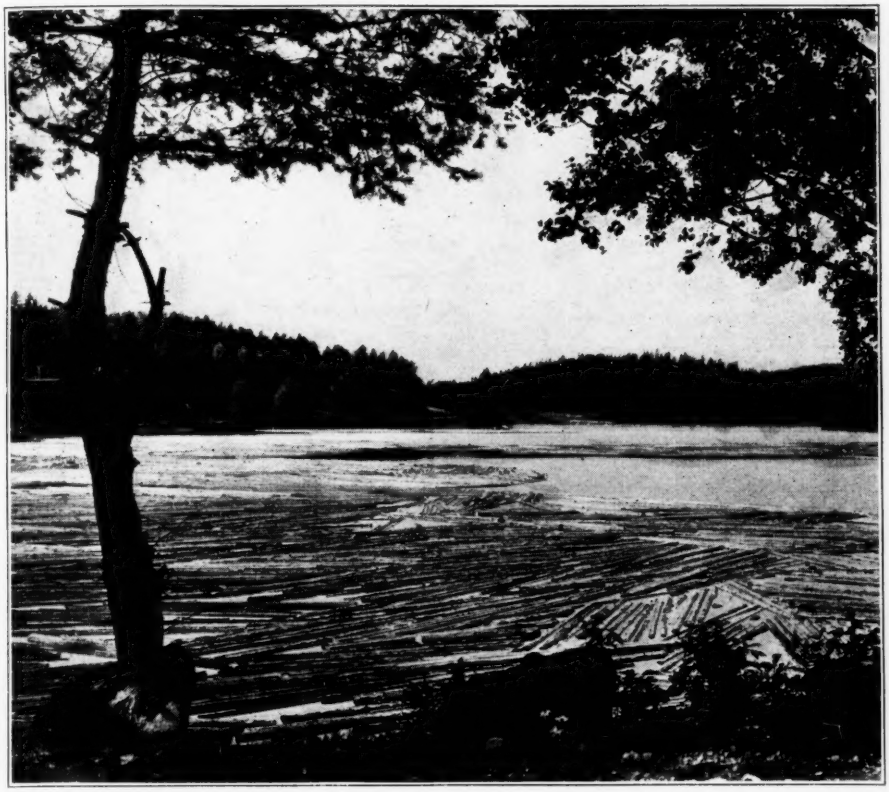

FIG. 3. Waterways are used for transporting the logs. (Courtesy, Swedish State Railways)

efforts, the length of all rivers in Sweden that can be used for floating is at present more than 18,000 miles or approximately three-fourths the length of the equator. About 145 million logs or 15 million cubic meters of timber are annually floated down the Swedish rivers; in addition approximately one million cubic meters are carried by rail.

An advantage of considerable importance is the fact that few forests, even in the northernmost part of the country, are located more than eight to ten miles from the nearest floating river. The

Swedish floating system is also favored by a large number of lakes which serve as water reservoirs in the spring and thus insure a more even flow in the rivers during the summer. These lakes also afford excellent facilities for the storing of logs en route to the mills. In the rivers of northern Sweden the ice begins to melt at the mouth of the river, continuing toward the source with the advance of spring. As a result the floating of the timber cut along the lower parts of the river can begin earlier and new territory can be included from week to week. This makes it possible partly to clear the lower portions of the river before the logs from more distant parts begin to arrive. The banks of the rivers are generally high so that the logs are practically never scattered by floods.

The floating season extends over the months of May to October. As soon as the ice melts, the logs, which have been branded with the mark of the owner and piled up on the river banks, are dumped into the river. The dumping is usually handled by the owner of the logs, while the floating itself is given out on contract in units of floating districts, each comprising seven to fifteen miles of the river. These contracts have definite stipulations with regard to the time when the floating should be completed and to the fines to be paid for logs that have not been brought thru the district. In the rivers the logs are generally floated separately, but across the lakes they are often towed in ring booms holding several thousand logs. The logs make an average speed of about 75 miles a month and the average distance of floating has been estimated at about 125 miles. Floating gives employment to approximately 35,000 men during the season. It is a very hazardous occupation and the yearly toll of life is high. Only the sturdiest men are employed, as it is often necessary for them to jump from log to log carrying long hooks with which to clear the jams that frequently occur. At times these jams become so serious that dynamite must be applied in order to loosen them.

In a suitable location toward the mouth of the river there is a sorting basin, in which the logs are sorted according to ownership. In some of the rivers there are basins that have a capacity for sorting nearly 100,000 logs in a working-day of eight hours. In a basin of this size, where up to 100 different brands may be handled at one time, more than 300 men a shift are employed and close to 15 million logs are sorted each year. When the logs have been sorted, they are chained together into bundles of about

200 logs or made into larger rafts which are towed from the sorting basin to the mills. In addition to the river-floating, several million logs are rafted every year up and down the coast in the Gulf of Bothnia.

At the mills the logs are made into planks, boards, pulp, paper and other products and then shipped to the various markets. The largest customers are the United Kingdom, France, Germany, United States, The Netherlands, Denmark, Spain, and Belgium. Considerable quantities are also shipped to British South Africa, Australia, and Algiers, Tunis, and Morocco.

The results obtained in Sweden show clearly that scientific growing of trees is profitable in spite of the long-term investments that are required. The marked shift during the last decade in the consumers' demand for forest products points toward increased returns from such investments in the future. The lumber production of the past is gradually being converted into pulp production which involves the rational cropping of areas from which the virgin timber has been removed. It also means the maintenance of a forest system with shorter renewal periods, smaller dimensions of timber, more spruce and less pine, a more rapid turnover and as a consequence a smaller outlay of capital with lower interest charges. All these factors give a more than reasonable assurance that fair returns may be expected from money invested in reforestation and indicate that a policy of rational forestry is not only desirable from a nationalistic point of view, but also good business.

# MAKING A LIVING IN CHINA*

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## I. THE MAJOR GEOGRAPHICAL UNDERSTANDING OR CORE THOUGHT

The major geographical understanding to be developed from the study of "Making a Living in China" is a realization of how the difficulty in securing the necessities of life for more than four million people where primitive methods of work are widely used, how the phenomenal growth of the bean industry in northern China, how the tea industry and China's efforts to regain its world trade in tea, how the silk industry, and other human activities are related to the following factors in the natural environment: large areas of infertile and rough land and large areas of deep, rich lowland soil; isolation by mountains, desert, and size of ocean; late monsoon in the north, summer rain and winter drought; winter temperature ranging from twenty to sixty degrees with summer temperature ranging from seventy to eighty-five degrees; floods, navigable rivers; good harbors; and tropical cyclones or hurricanes.

## II. RELATIONSHIPS TO BE DISCOVERED BY PUPILS DURING STUDY

The relationships here indicated are only those between certain cultural and natural items. Other cultural items also influence the various activities.

### 1. Early Development

| | |
|---|---|
| Early development of a civilization based on agriculture | Isolation resulting from barriers of mountains, ocean, and desert which gave protection |
| Building of the Great Wall of China | Desert and semi-arid lands to the north inhabited by warlike, nomadic people |
| Building of the Grand Canal | Low, flat plain; two commercially important rivers to be connected |

### 2. Distribution of Population

| | |
|---|---|
| Concentration of population in eastern section | Plains and valleys with rich soil; more certain rainfall; easier access to rivers and harbors for transportation |

* China here should be interpreted to mean China Proper. This unit was taught to a seventh grade mixed group in ten lessons.

| | |
|---|---|
| Large areas sparsely populated | Mountains; large marshy areas; some infertile, sandy tracts; semi-arid conditions; distant from good natural facilities for transportation |
| Scattered inland areas of dense population | Presence of lowlands and basins with deep, rich soil; access to navigable rivers |

### 3. Homes

| | |
|---|---|
| Use of brick as chief building material | Abundance of clay in most sections; scarcity of timber |
| Kang heating system used extensively in plateau provinces | Lack of timber and fuel; cold winters |
| Peasants use paper instead of glass for windows | Abundance of vegetable matter, as rice and straw for paper; lack of fuel for glass making; lack of raw material |
| Considerable portion of population lives on boats | Scarcity of land; numerous waterways |
| Whole towns in the loess regions sometimes live in caves | Scarcity of land, forests, and fuel |

### 4. People

| | |
|---|---|
| Unwarlike but independent | Isolation |
| Famines, especially in the northern part of China | Late monsoon; uncertainty of rainfall; floods by rivers breaking thru dikes; insect pests; lack of forests; mud deposits raise rivers |
| Use of heavily padded cotton clothes in the North in winter | Long growing season in South China; delta soil; abundant rain; scarcity of fuel; cold winters in the North; dry climate (They can sell their wool.) |
| Chinese are superstitious and beggars are numerous | Drought and flood bring poverty (Extreme poverty tends to result in ignorance and superstition.) |

### 5. Government

| | |
|---|---|
| Badly disorganized | Vast area |

### 6. Agriculture

| | |
|---|---|
| Rice in the Yangtze Valley and in the lowlands south of this valley | Abundant water supply; heavy compact soil in many places; rice a nourishing food; keeps well in a moist climate; quantity an acre greater than that of any other grain; long hot summer |
| Kaoliang and millet grown in North | Matures quickly; is drought resistant |

| | |
|---|---|
| Hard wheat a very important crop in the North | Dry-land grain |
| Soft wheat grown in central China | Warmer climate permits winter crop |
| Tea industry in South China and in the Red Basin | Highlands; good drainage; plenty of spring and summer rain; long growing season |
| Silk most important "money crop" | Mulberry bushes abundant in central and southern China; oak leaves in Shantung |
| Cotton becoming "money crop" | Long growing season in southern part of Great Plain; delta soil; abundant rain |
| Great numbers of pigs, ducks, and chickens are raised | Require little land area; live largely on food people could not consume |
| Terrace of mountain slopes in southern highlands | Scarcity of farm land; good drainage |
| Beans raised in North China | Extensive plains; soya bean fertilizes the soil; more food per acre than wheat would yield; short summers |
| South China frequently raises two crops of rice yearly on the same land | Long growing season; abundant rain |
| Interculture common even in North China | Scarcity of farm land |

## 7. Mining

| | |
|---|---|
| Tin leading mineral export of China | Extensive deposits in Yunnan |
| Coal foremost mineral of China | Anthracite deposits in the region of Shansi equal those of Pennsylvania; extensive deposits of bituminous coal; near (comparatively) to river and railroad |
| World's largest producers of antimony | Vast deposits in Hunan; nearness to river and railroad |

## 8. Manufacturing

| | |
|---|---|
| Flour mills at Tienstin and at Shanghai | Seaports; river connection with wheat-growing regions |
| Iron and steel mills at Hankow | Tayeh iron ores; river port; ocean vessels reach Hankow |
| Shanghai has cotton and silk mills | Seaport; river connection with silk and cotton-producing areas |
| Home manufacturing common | Cotton for lace and embroidery; cues for hair nets; straw for matting; cold winters in North provide spare time |
| Chinese make excellent chinaware | Extensive beds of fine clay |

### 9. Transportation

| | |
|---|---|
| Numerous canals in eastern lowlands | Large areas of flat lands; uncertainty of rainfall and consequent need for either drainage or irrigation |
| Over enormous areas roads are unfit for motor traffic | Relief; loess plains of Shensi and Shansi; scarcity of farm land |
| Present railroads are in eastern China | Extensive lowland; nearness to rivers and harbors |
| Many rivers are busy highways | Navigable for great distances |

### 10. Commerce

| | |
|---|---|
| More trade with Japan than with any other country | Location near Japan and distant from other great manufacturing and food-producing sections of country |
| Trade in the cities on the lower Yangtze make this area one of the greatest distributing centers of the world | Good harbors; river navigable for ocean steamers; the richest hinterland of the country |
| Bean products and raw silk chief exports. Raw cotton, tea, egg products, coal also exported | (As stated after each separately under headings Agriculture and Mining) |

### 11. Fishing

| | |
|---|---|
| Fish important food | Scarcity of animals; fish abundant in rivers; cod off northeast coast |

## III. Introduction to the Class

The teacher asks the question: When the Chinese recently declared a boycott on Japanese goods why did Japan choose to attack Shanghai in preference to any other place in China?

Leading statements and questions:

1. Note the location of Shanghai near the mouth of the Yangtze.
2. Might Shanghai be important commercially?
3. Fifty-one per cent of China's imports and thirty-one per cent of its exports for 1930 are credited to Shanghai.[1]
4. The trade in the cities of the lower Yangtze, Hankow, Wuchang, and Hanyang, makes this one of the greatest commercial regions of the world. What does this suggest about the number of people in China?
5. Find out how many people China has. Find its area.
6. If six-sevenths of the people of China live in one-third of the area find out how this density of population would compare with that of Texas if all the people of the United States were in Texas.
7. Would you like to find out why the people of China settle one part of their country so densely?

[1] Commerce Year Book, 1931.

## IV. ASSIGNMENT

1. Class will spend two or three minutes looking at each of the following:

a. Political map of China
b. Physical map of China
c. Rainfall map of China
d. Map showing climatic regions of Asia

2. Teacher: Reading the map you learn some facts which may influence the way the people of China make a living. What are some of these facts? (The teacher's object here is to have the class stimulate their own interest in the study by trying to talk about it and at the same time to have them cultivate a habit of relevant map reading.)

3. Answers from the class.

a. Much of eastern China is a lowland.
b. Western and much of northern China is semi-arid.
c. All of eastern and southern China receives abundant rain.
d. Part of western China has an altitude of over 10,000 feet.
e. In northern China the climate is humid continental with long summers.
f. Central and southern China has the climate of east margins of continents in lower middle latitudes.
g. China is bounded by a vast high plateau on the west, a desert on the north, an ocean on the east, and by an ocean, lowland, and mountains on the south.

4. Teacher: What are some of the facts that are not suggested by the maps that you will need to find out in order to learn how the people of China make a living? (The teacher's object here is to have the class stimulate their own interest and to form a habit of making tentative solutions to a problem.)

5. Questions from the class:

a. Does China have iron and coal?
b. What do the Chinese have for power in manufacturing?
c. What do the Chinese manufacture?
d. What does China sell?
e. What does China buy?
f. What do the Chinese eat?
g. What do the Chinese use to make clothing?
h. Why do we often hear of floods and famines in China?
i. Do the Chinese have automobiles and airplanes?

6. Teacher: In finding out how these natural conditions influence the Chinese in making a living and what natural resources they have and how they use them, what interesting activities might be engaged in?

7. Activities: Suggested by the class.

a. Read the text
b. Read supplementary texts
c. Read the World Book
d. Read Compton's Pictured Encyclopedia
e. Refer to World Almanac
f. Look at stereographs with stereoscopes
g. Read backs of stereographs
h. Bring in Chinese articles
i. Collect geographical pictures
j. Get a Chinese newspaper
k. Make a list of new words

8. The teacher posts the following bibliography and asks anyone who finds something worth adding to the list to add it.

a. Atwood and Thomas: Nations Beyond the Seas, pp. 306-325. Ginn and Co.
b. Barrows, Parker and Parker: Europe and Asia, pp. 182-205. Silver, Burdett and Co.
c. Branom and Ganey: Our World, pp. 356-363. William H. Sadlier
d. Dodge, R. E. and Lackey, E. E., Advanced Geography, pp. 398-403. Rand McNally and Co.
e. McMurry, Frank and Parkins, A. E.: Advanced Geography, pp. 409-420. The Macmillan Co.
f. Packard and Sinnott: Nations as Neighbors, pp. 457-469. The Macmillan Co.
g. Smith: Human Geography, Book I, pp. 313-321. Book II, pp. 324-334. The John C. Winston Co.
h. Allen: Asia. Ginn and Co.
i. Huntington: Asia, A Geographical Reader. Rand McNally and Co.
j. Dakin: Great Rivers of the World. The Macmillan Co.
k. The World Book
l. Compton's Pictured Encyclopedia
m. Keystone 600 Set
n. Many little booklets, magazines, etc., on reading table:

(1) *Home Geographic Magazine*
(a) Cressey: The Chinese of Celestial Cathay, March, 1931

(2) *National Geographic Magazine* (for pictures)
(a) The entire copy, Nov., 1920
(b) Rock: Banishing the Devil of Disease Among the Nashi, Nov., 1924
(c) Simpich: Manchuria, Promised Land of Asia, Oct., 1929
(d) Warwick: The Mongols, People of the Wilderness, May, 1921
(e) Warwick: A Thousand Miles Along the Great Wall of China, Feb., 1923

(3) *Geographic News Bulletin*
(a) Shantung's Industries: Hair Nets to Railways, Mar. 22, 1920
(b) Where Chinaware Comes From, Apr. 25, 1921
(c) Tienstin, The Panorama City, Apr. 11, 1921
(d) Peking: The Chicago of China, Feb. 5, 1923
(e) Canton, Ancient Chinese Metropolis, Adopts City Planning, Apr. 20, 1931
(f) Honanfu, Inland City Suggested as New Chinese Capital, Oct. 26, 1931

(4) Lewis: Mo Yuin Gets His Chance, *Junior Red Cross News*, Feb., 1930

(5) Our Imports and Who Use Them, Issued by the National Foreign Trade Council
(6) Rea: The Greatest Civilizing Force in Eastern Asia, *Far Eastern Review*, Nov., 1924
(7) Chinese Jade. A leaflet
(8) The Exhibits of the Republic of China in the Sesqui-Centennial International Exposition, 1926. A booklet
(9) A set of Huntington Economic Desk Maps. Denoyer-Geppert Co.
(There are many more pamphlets which may be secured but the above list is suggestive.)

## V. WORKING PERIOD

1. With the teacher directing, the class begins the study of the unit from the text.

a. Look at the maps showing: distribution of population, distribution of rainfall, and topography. When you have them pretty well in mind try to make a rough sketch of each. (Use outline maps and take ten to twelve minutes only.)
b. Find out how the distributions of rainfall and of people compare in location.
c. Trace the three important rivers and note their location relative to the distribution of population. How may these rivers help or hinder economic development of the sections thru which they flow?
d. Reading your text, find out what the Chinese use for food, clothing, and shelter. Also find out what kind of methods of work they use and what means they have for the exchange of products.

The class arrange on the blackboard the following outline. After each item they indicate the natural conditions which influence it as given in part II of this outline.

Chief foods produced in North China and used there

(1) Kaoliang
(2) Millet
(3) Wheat
(4) Barley
(5) Soya bean
(6) Sweet potato
(7) Fish
(8) Melons
(9) Peanuts
(10) Corn
(11) Apples
(12) Vegetables

Chief foods produced and used in Central China

(1) Rice
(2) Wheat
(3) Tea
(4) Vegetables
(5) Fish
(6) Maize
(7) Millet
(8) Oranges
(9) Sugar
(10) Beans

Chief foods produced and used in South China

(1) Rice
(2) Tea
(3) Oranges
(4) Sugar cane
(5) Vegetables
(6) Maize
(7) Wheat
(8) Corn
(9) Fish

Chief clothing in all parts of China

(1) Cotton
(2) Some silk

Shelter—Most common

(1) Brick houses and stone houses
(2) House boats
(3) Caves in North
(4) Thatch or clay tile roof
(5) Oiled paper windows in peasant homes
(6) Limited fuel. Houses cold in North and Central Parts

Some ways of working

(1) Manufacturing done largely in homes
(2) Hand looms used for weaving
(3) Modern mills and factories in large cities
(4) Crude farm implements widely used
(5) Junk and sampan widely used

Means for Exchange of Products

(1) Few railroads
(2) Vast areas with no good roads
(3) Streams and canals not commonly bridged
(4) Thousands of canals
(5) Many navigable streams
(6) Large river and ocean ports

2. Eight volunteers are asked to report on the topics for discussion during the Expression Period. These eight may discuss their own topic or they may assign a part of it to someone else. All are directed to engage in whatever activity they choose from those listed by the group. (The teacher moves about among the class to answer questions and offer suggestions where they are needed.)

## VI. Expression Period

1. All the pictures collected and any Chinese articles brought in will be on exhibit in the classroom.

2. A group of children, or a teacher, or some other person may be invited to the class as a means of stimulation to the child to do his best. An audience situation will make the speaker feel that what he is saying is new to at least a part of his audience.

3. A child will report on each of the following subjects and after his report he will be the leader in an informal discussion on his report. That is, he will answer questions, hear comments, and have his report criticised.

a. Why the struggle is so hard
   (1) Great numbers of people
   (2) Hand labor
   (3) Superstition
   (4) Ancestor worship
b. Chinese wonderful farmers of the garden farmer type
   (1) Beans and other vegetables
   (2) The grains

(a) Rice
(b) Millet
(c) Wheat

c. The "money crops" for export
(1) Tea
(2) Textile material
(a) Silk
(b) Cotton
(3) Peanuts and soya beans—Their oils
(4) Eggs

d. Other foods for meat
(1) Poultry
(2) Eggs
(3) Fish

e. Manufacturing
(1) Home-manufacturing
(2) Mills and factories

f. Transportation
(1) Primitive. Gives employment to many
(a) Portage
(b) Wheelbarrow
(c) Water
(2) Modern means of
(a) Railroad
(b) Highway
(c) Aviation

g. Mineral resources and their development
(1) Coal and iron
(2) Tin
(3) Antimony
(4) Petroleum
(5) Others

h. Commerce
(1) Home
(2) Foreign

(Each child giving a report was encouraged to emphasize any relationship between human activity and natural environment whenever possible.)

## 4. Other Activities.

a. One child may wish to read or talk about the list of new words.
b. Another may wish to read all the relationships between the human activities and the natural environment that have been listed.
c. The children may tell what books they liked best in their study of China.
d. Usually someone will bring in something unexpected that is worth mentioning for its geographic value.

## 5. Summary.—Two or three children are asked to summarize the study and each asks for correction or suggestion on his summary. From this will come such a summary as the following:

For several reasons China finds it hard to furnish the necessities of life to all

its people. The Chinese have been isolated by mountains, ocean, and desert. In their very early history this isolation gave them sufficient protection from attack so that they early became a highly-civilized agricultural people. Later this isolation proved to be a damper on their progress in as much as it limited their contacts. This lack of contact together with their love of their ancestors has kept them from making a material progress comparable to that of other leading world powers. And this lack of what we call progress has necessitated rare industry among the Chinese and has made them continue to be chiefly an agricultural people. The fact that the chief industry is agriculture has made the delta lowlands in the east, and other lowland sections which have rich soil, the densely populated sections. Hot summers and summer rain make agriculture possible. The great extent of the country with a consequent variety of natural conditions makes possible a great variety of crops. The long, hot summers and an abundant water supply permit rice-growing in central and southern China. The good drainage on the terraced southern highlands with warm sunshine and plenty of spring and summer rains permits the growing of tea. A highland region where there is abundant summer rain together with a supply of cheap labor makes possible the growing of mulberry trees and the production of silk in southern and parts of central China. The delta soil, long growing season, and heavy rainfall make possible cotton-growing in the southern part of the Great Plain. The short growing season and limited rainfall provide conditions in the North for growing such hardy crops as kaoliang, millet, spring wheat, corn, hemp, and soya beans. Silk in the North from worms fed on oak leaves is made into the rough material that we call shantung and is not smooth like that from worms fed on mulberry leaves. The hand-methods used in farming their crops, the practice of interculture, the building of the Great Wall, and the systems of canals and irrigation ditches all bespeak the great industry of the Chinese. Poverty, which results in ignorance and superstition, is not peculiarly Chinese, nor does it prove the Chinese to be inferior but it is rather a result of uncertain rainfall, isolation, and floods resulting from deforestation and a position in the path of tropical storms. The vast area, abundant natural wealth with possibilities for mining and manufacturing, good harbors, and long navigable rivers have resulted in some exploitation of China by more aggressive nations. If China can stabilize its government, build railroads and highways, adopt modern methods of working, and secure capital for the development of its own resources it may again become a foremost nation. But good government, the building of railroads, and highways, and the development of natural resources are so interdependent that they must all be developed together.

## VII. TESTS

1. *Relationship Test*

Place in the parentheses before each part of the second column the number of the part of the first column to which it is most closely related.

| | |
|---|---|
| 1. Mountains | ( ) Grazing |
| 2. Break in transportation | ( ) Sparse population |
| 3. Semi-arid regions | ( ) Farming |
| 4. Floods | ( ) Dense Population |
| 5. Mining | ( ) Denuded hillsides |
| 6. Range of latitude | ( ) Range of products |
| 7. Isolation | ( ) Tropical hurricanes |
| 8. Delta plains | ( ) Location of a city |
| 9. Delta plains | ( ) Backwardness in the use of modern methods of work |
| 10. Navigable rivers | |
| 11. East coast in lower middle latitude | |

2. *Vocabulary or Completion Test*

Supply the missing word or words in each of the following:

(1) The heating system used in the plateau provinces of China is called the ..... system.
(2) ..... is the material most used for building in China.
(3) ..... are winds that change with the seasons.
(4) The national drink in China is .....
(5) The ..... and the ..... are the two common kinds of vehicles in China.
(6) A kind of soil transported by the wind in north China is called .....
(7) Chinese refuse to leave their old homes and to adopt modern methods of work because they worship their .....
(8) China has not many railroads or highways but it has thousands of .....
(9) The growing of two or more crops in alternating rows in a field is called ..... .....
(10) The quantity of ..... that can be raised on an acre of ground is greater than that of any other grain.
(11) The ..... has been called "China's Sorrow" because at times it causes the destruction of so many lives.
(12) ....., ....., and ..... are some of the chief exports of China. ....., ....., and ..... are some of the chief imports.

3. *Reading Test. True—False*

a. Read the following paragraph and then mark the statements which follow it true or false by placing a T or an F before each.

At night we slept on the usual stone kang in a Chinese inn. In the morning while it was yet dark we started across a treeless country where the only vegetation was a little grass here and there. Occasionally we saw a few of the movable homes of nomads.

(1) We were in a farming region.
(2) Building material of different kinds was likely easily available here.
(3) The people here likely made their living by grazing.
(4) The homes of the nomads were likely built of clay.
(5) The rainfall was scanty.

b. Read the following paragraph and continue as before.

Women in the United States of America began to ride in automobiles and Shantung peasants began to have a little more food because they were tieing combings and discarded cues into invisible coverings for American coiffures. They knew as much about the use that was to be made of the hair nets that they were making as the American woman who wore them knew of the romance of their construction. Bobbed hair became the fashion among American women and a result was an experience of more hunger among Shantung peasants.

(1) Women and children in Shantung who tied hair nets earned less when American women began to wear bobbed hair.
(2) There can be no causative relationship between the amount of rice in the bowl of a Shantung peasant and the style of hair worn by American women.
(3) The Chinese peasants who made hair nets knew nothing about the use that was being made of them.
(4) People the world around are dependent upon other people to produce things for them and to buy things from them.

4. *Test on Geographical Interpretation of News Article**

a. Read the following article and list the geographical relationships suggested in it.

HUNDREDS DIE IN CHINA STORM

*Famine Sweeps Plague-Lashed Province; Typhoon Perils Ships*

HANKOW, CHINA, Aug. 25—(*By the United Press*). Storm followed flood and plague today in the valley of the Yangtze River, where deaths were already counted in thousands.

Hundreds of Chinese, many stoically offering themselves as sacrifices to the river's angered dragon god, were drowned in the typhoon-like storm that raged thruout the night and was unabated today.

Thousands of homes were smashed. The storm flattened almost every structure that had escaped the Yangtze flood path.

*Shipping Periled*

Shipping was endangered, but junks and sampans had little prospect of finding refuge. Typhoon signals, harbingers of storm wrath, flew along the river.

The terror of night, strangely close to natives who sat almost motionless in a blistering sun but began wails of anguish and despair when darkness settled over them, was increased manifold when the wind lashed thru the flood area.

Waves crashed over the miserable refuge of survivors who clung to wreckage or huddled in parts of dwellings left habitable; the wind shrieked its message of death.

*Relationships.*

| | |
|---|---|
| A typhoon signal in Yangtze Valley | China's location in the path of tropical storms; delta plains (no barrier to wind) |
| Loss of life | China's location on east coast in lower middle latitude; uncertain rainfall; delta plains; lack of forests; mud deposits in the river |
| Natives sat in blistering sun | Extreme summers in east coast lower middle latitude |

## VIII. TEACHER'S BIBLIOGRAPHY

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* *The Pittsburgh Press.*, Aug. 25, 1931.

# FUNDAMENTAL VOCABULARY IN ELEMENTARY SCHOOL GEOGRAPHY

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Ohio State University

## PURPOSES AND TECHNIQUE OF THE INVESTIGATION

For some years the writer has been interested in the matter of special vocabularly in the school subjects. In the case of geography a preliminary study[1] showed a total of nearly 1500 words, of which some, however, were obviously not technical but were somewhat difficult words of a general character. It seemed therefore desirable to make some further analysis and study of the situation in order to determine what words represented the really fundamental vocabulary of this subject at the elementary level.

The writer therefore (a) selected six widely-used geographies for intensive study. A frequency count was made, by a different reader, for each of the six. The readers were instructed to include every word that could, by any stretch of the imagination, be regarded as special. The result was a list of 1008 different words,[2] varying in frequency from one single occurrence to 713 appearances in the six books. Of these 1008 words, 311 occurred six times or less —that is, an average of only once a book.

The next step (b) was to compare these words to the Thorndike Word Book[3] and to eliminate any terms occurring in the most frequent thousand of the Thorndike List. Presumably children will learn these eliminated words as part of their general reading. Examples of the words thus eliminated are: cow, fish, orange, river, railroad, farm, fog, air, country. The standard for elimination was kept as low as the first thousand because the final list of essential terms was intended for use as early as the third or fourth grade. The number of words thus eliminated was 327. When words of such extreme simplicity and frequency in general reading had been dropped, the writer next (c) removed those that did not occur at

[1] L. C. Pressey. Special Vocabularies in the Public School Subjects, No. 9. Public School Publishing Co., Bloomington, Illinois.

[2] This total is smaller than that of the earlier study because only elementary school texts were used, whereas several high school texts were previously included.

[3] E. L. Thorndike. The Teacher's Word Book, p. 134. Teachers College, Columbia University, New York City, 1921.

least five times a book and in at least five of the six books. This procedure eliminated 556 words. Examples of such words are: yak, sapphire, constellation, pecan, cascade, cobra, resin. Finally (d) the writer had each word of the 1008 rated as to importance by 71 elementary school teachers. These teachers were instructed to rate a word as "essential" if thy could not teach without it, as "accessory" if it were important but not vital, and as "non-essential" if they could get along without it altogether or if they thought it was not a special word in geography. Words that were rated as accessory or non-essential by a majority of these teachers were next eliminated. There were 682 such words.

When one eliminates the 327 words found in the first thousand of the Thorndike Word List, the 556 infrequent words, and the 682 that teachers felt were unimportant (of course, these were often the same words, so the total of these sums comes to more than 1008) there remained only 228 words that passed all three criteria. This final list which is only 22 per cent of the original number is presented below.

## Results of the Investigation

It should be noted that the terms have been classified into groups so as to bring out related meanings wherever possible.

camel
hogs
deer
llama
salmon

potatoes
vegetables
olives
grapes
oranges

cocoa
coffee
tea
barley
hay
oats
rice

pine
rubber

cotton
tobacco

fuel
gas
oil
petroleum
turpentine

copper
iron
*lead
metals
deposit
mineral
*mine
ore
tin

marble
granite
limestone
quarry

clay
mud
*soils

gravel
nitrate

coral

climate
dew
moisture
fogs
frost
cyclone
*"high"
*"low"
season
rainfall
temperature
vapor

arctic
area
belt
equator
region
section

temperate
torrid
tropics
zone

border
boundary
capital
colony
province
republic
district
rural
shelter
territory
foreign

railroad
transportation
steamship
vessel
highway
route
voyage

caravan
basin
canal
channel
current
dam
harbor
flood
gulf
mouth (of river)
*narrows
navigable
ocean
outlet
port
*rapids
source
strait
tributary
waterpower
waterway
coastal
sea coast
sea level
seaport
seashore
barrier
cliff
*divide
highland
peak
range
ridge
rugged
slope
summit
volcano

altitude
elevation
lowland
pasture
plateau
prairie
upland
continent
globe
hemisphere
sphere
century
modern
civilize
inhabitant
settlement
*race
tribes
nomad
language
occupation
native
population
horizon
latitude
pole
rays
surfaces
axis
longitude
level
rotate
explore
discovery
expedition
mainland

oasis
peninsula
delta
desert
swamp
iceberg
icesheet
glacier
acre
agriculture
crops
cultivate
irrigation
orchard
plantation
produce
raise
fertile
fertilizer
vegetation
vineyard
yield
cattle
flock
herd
hides
ranch
wool
grazing
commerce
import
*stock
freight
*goods
industry
manufacturing

machinery
material
production
raw materials
factory
export
cargo
dock
shipping
jungle
lumber
timber
fisheries
dairy
steel
wine
flour
location
map
conservation
resources
abundant
barren
dense
drain
compass
navigation
northwest
northeast
*point
(of compass)
southeast
southwest
direction

* Terms thus checked are found in the first thousand of the Thorndike Word Book, but have so many non-technical meanings that the frequency of the special meaning is presumably much lower. In fact, common words with a number of possible meanings often present greater difficulty than less frequent words of a single meaning.

## PRACTICAL USES OF THESE MATERIALS

The writer feels that this matter of vocabulary is too often neglected, partly because some teachers feel that teaching isolated words is a routine and mechanical thing; partly because the extent of the total, unanalyzed vocabulary is bewildering—not to say staggering; and partly because there are no easy and convenient

instruments for measuring the knowledge of such words. The writer therefore designed in preliminary form a test for investigating the mastery by each child in the room of each essential word.[4] The items in this test rarely present a definition, but rather call for recognition of each term in a setting not unlike that in which it appears in the ordinary reading of a textbook.

It is hoped that the work done in isolating the essential terms and in making easy the measurement of their mastery by pupils will result in a greater attention being paid to vocabulary. No one can think without meanings, and meanings are symbolized by words. Knowledge of these fundamental meanings is, then, essential for any real thinking in the field of geography.

---

## IN THE DESERT

O. D. VON ENGELN
Cornell University

When first viewed the desert landscape is not especially impressive. The newcomer from humid lands sees barren, gullied mountains and wide expanses of rocky waste. Waste land at the outskirts of a great city, or sites on which some large building project is in progress give similar prospects. Such places, too, are denuded of vegetation and scarred by excavation.

The fascination of the desert, that is so much written about, is experienced only after a period of becoming acquainted. When considering this article, which could have only one illustration, I was most reluctant to give up using a picture called Dripping Blood Cliff. It shows a great wall of volcanic rock on the east side of Death Valley with red lava above and light-colored, fragmental volcanic stuff below. The name Dripping Blood Cliff is highly imaginative but entirely appropriate. The color is extraordinarily vivid in the bright sunlight. The rock at the top of the cliff looks exactly like a great haunch of dark-red meat; it could be the flayed carcass of a whale. From this mass thick strings of the same red substance, the dripping blood, run down the face of the white material of the lower slopes. Other names in Death Valley are similarly descriptive. To exemplify, consider Grapevine Springs. A num-

[4] The results of this tentative work have been distinctly encouraging. Teachers are urged to develop similar materials for use with different sections of subject-matter in their own courses.

ber of springs emerge close together on the upper slopes of a barren mountain side and threads of green vegetation follow each runlet of water in interlaced courses down to the valley floor. Or think of Funeral Mountains, Furnace Creek, Ubehebe Craters. The actual sights warrant the wierdness of the names. It would be difficult to conceive anything quite so unearthly as the prospect of a "forest" of Joshua trees (*Yucca brevifolia*) extending across a high desert plain toward the eastern horizon at dawn, as I saw it on the road to Goldfield, Nevada. The word forest is in quotes because the Joshua trees, like all desert vegetation, grow with wide unoccupied spaces between. One looks thru such a forest rather than into it.

However, the picture that was selected to go at the head of this description is intended to convey the idea of the desert as a whole, rather than to show its particulars. It is a view from a ridge that rises about 1500 feet above the levels of the floors of adjacent basins. The place is south and west of Fish Lake Valley, Nevada. One feels the shimmering sun, the distances which seem so near, the barren furrowed hills, the purple shadows, the long slopes of waste, and in the foreground, the granite rock crumbling under long continued slow weathering.

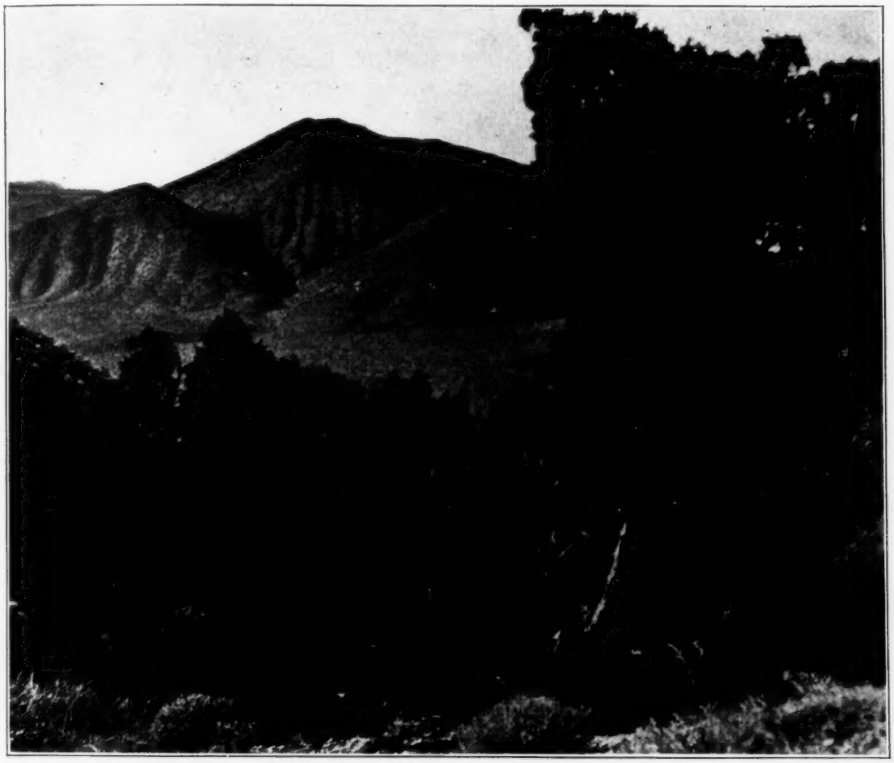
Most important of all the picture gives reality to the vast desert stillness.

The conspicuous feature of the foreground is the clump of mountain juniper which keeps green and is flourishing despite the surface indications of general and uninterrupted drouth. The success of the juniper clump is a clue to the occupation and utilization of the desert. The tufts of dry grass and the sage brush are also evidence of the vegetative potentialities of the desert. For these desert tracts, barren as they seem, are not uninhabited. And the vegetation, sparse tho it is and dry, indicates the presence of water underground or its recurrent supply to the surface.

The permanent and fixed inhabitants are the ranchers. Equally permanent but less fixed in their abodes are the Indians. Least certain either in time or place are the prospector-miners.

The old time rancher surveys what seems to the easterner a barren hillside and murmurs: "Wonderful pasture." You show your surprise and he points to tufts of grass, dry in September, 2 to 3 inches across, spaced 2, 5, 7 feet apart and spreading down the slope, or to patches of white sage brush, a variety less hard and woody than most.

Vast acreages of desert country are required to support herds of moderate size. The focus of activities is the ranch house located on an oasis where the water supply is relatively abundant. There alfalfa is grown for winter feeding. In spring and in fall bunches of young cattle are driven to the site of a spring, commonly located at the base of a mountain slope. After being introduced, as it were,



Desert slopes and summits in the region of the Great Basin, near the Nevada-California boundary line. View looks northward toward Fish Lake Valley, Nevada (Photo by O. D. von Engeln)

to the water the cattle are left to shift for themselves, seeking such pasture as that described above. With the spring as a base they graze as widely as thirst permits. In summer the cattle are collected and driven to mountain pastures, green thruout the hot season because of their altitude; the practice of transhumance. When winter snows collect on the heights there is another round-up. The cattle are then brought to selected pastures in sheltered spots near the oases, and, if need be, supplied with fodder.

The desert mountains, accordingly, are important to the economy of the ranchers. The Indians gather pinon nuts and hunt deer in the hills, shoot wild fowl around the desert lakes, trap jack rabbits and do some small cultivation around a spring for subsistence.

The miner-prospectors on the other hand are grubstaked; their supplies come from the outside. The vein they attempt to explore and to develop may be far from water, which must then be patiently transported and is used sparingly. Innumerable prospects are variously dug at and tested, long toilsome work; few of these prospects ever become mines. The hills however are fairly dotted with holes where someone has begun and quit.

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## EDITORIAL NOTES AND NEWS

The Geography Yearbook of the National Society for the Study of Education will be discussed at the Minneapolis meeting of the Society, Saturday and Tuesday evenings, February 25 and 28, 1933. The Yearbook has been prepared in cooperation with the National Council of Geography Teachers. It presents the work of many people and the results of extensive research covering a period of several years. No doubt this volume will be the guide to geographic education for many years. Every geography teacher and school administrator should secure a copy.

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The West Virginia Council of Geography Teachers reports an interesting program at the fall meeting held at Huntington. A number of new members were enrolled in the State Council.

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The first medal awarded by the Society of Woman Geographers was recently presented to Amelia Earhart.

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According to the 1932 Report of the Department of Agriculture erosion has practically destroyed 21,000,000 acres of land formerly in cultivation. Where continuous corn cropping occurs in the Corn Belt, the soil which was formed at the rate of one inch in 400 years is removed by erosion in ten to fifty years according to the steepness of the slope. To combat this soil depletion Congress three years ago authorized the Department of Agriculture to initiate a national conservation program. Among the preventive measures recommended in areas of limited rainfall is the use of a cultivator that digs 10,000 holes an acre. The holes not only check sheet erosion but help retain water. Other practices suggested are terracing and filling gullies with grass sod dams effected thru the use of old sacks filled with sod. That farmers are cooperating with the Department is evident from the fact that in 1931 a million acres of crop land in Texas were terraced.

This attempt to control erosion is only a part of the greater program of the Department and of many state and private agencies which look toward a national land-use planning. This program looks toward a better economic use of our land resources, provision for future timber and public recreation needs, preservation of wild life, gradual diversion to other purposes of lands submarginal for farming, guidance in land settle-

ment, and adjustments in taxations and expenditures. The entire report is worthy of a place on the geographer's bookshelves.

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The announcement by the Geographical Press, Columbia University, of an inexpensive astrolabe and alidade may be of interest to students of astronomical geography.

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The fifteen most valuable crops in this country in order of their value in the 1930 census are corn, hay, cotton, wheat, oats, potatoes, tobacco, oranges, barley, apples, sugar beets, tomatoes, dry beans, grapefruit, and sweet potatoes. How to find new food and industrial uses for these and other crops are problems of the Bureau of Chemistry and Soils. In this connection chicory is attracting attention because of its inulin (not insulin) content reputed beneficial for diabetics.

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The rapid expansion of soybean cultivation in the United States last year resulted in the export of more than two million bushels, much of which went to Germany.

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So efficient is the lock system in the new Welland Canal that a ship can negotiate this twenty-five mile waterway in less than eight hours. The lift of the locks is 326½ feet. Each of the eight locks is 820 feet long.

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Comparison between the new world map of the National Geographic Society and the one published 10 years ago reveals that the new one has 500 entirely new place names and more than 1000 changed ones. According to the Society's Geographic News Bulletin, December 5, 1932, the press had to be stopped three times during the last stages of the publishing in order to make last minute changes. Among these changes are Ankara for Angora, Alep for Aleppo, Damas for Damascus, Izmir for Smyrna, Tehran for Teheran, and Arkhangelsk for Archangel.

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A park memorial for Theodore Roosevelt has been presented to the United States by the Roosevelt Memorial Association. This park of about ninety acres is a wooded island in the Potomac, within the boundaries of the District of Columbia. It will be known as Theodore Roosevelt Island.

## GEOGRAPHICAL PUBLICATIONS

Hendrik W. Van Loon. **Van Loon's Geography.** 525 pp. Illustrated. Simon and Schuster, N.Y. 1932. $3.75.

It is rather remarkable that a book with the sole title of "Geography" should have been selected as the October "Book of the Month." Its title might have caused people to hesitate in buying the book because it sounds like a textbook. Whether it is the reputation of Mr. Van Loon, his interesting style, or the natural interest of the public in geography which has popularized the book, I am unable to say.

The first eighty pages of the book will not appeal to the trained geographer. They concern the elements of man's physical environment and are interestingly described but lack accuracy or, at best, contain many statements which are misleading. The author says that two of his chief reference materials were a ten-cent store globe and the World Almanac. One can hardly write authentic geography with such equipment. To illustrate:

". . . the poles could not help becoming flat as soon as our speck of dust began to revolve around its own axis." p. 13

". . . when the ships of Magellan had sailed long enough in a westerly direction, they finally returned to the place from which they left." p. 17

"Because some of the air is usually warmer than the rest and therefore lighter and has a tendency to rise as high as it can go. When that happens there is a vacuum." p. 24

"Since our stove, the sun, burns much longer and more fiercely in summer than in winter." p. 25

"The rainfall of the Tropics is both regular and abundant." p. 30.

"And now a few words about the earth itself, and about that thin crust of hardened rock on which we live." p. 78

". . . Australia which has no rivers at all." p. 78

There are many such careless statements in the book but do not lay it aside because of these first eighty pages. When Mr. Van Loon begins to describe the various countries of the world, altho the trained geographer will find little that is new and a brevity of discussion, he will be pleased with the author's interesting and human way of telling the story. Many of the illustrations are pleasing and helpful.

Perhaps the most valuable contribution of Mr. Van Loon to teachers of geography is the idea of how geography may be made interesting. Perhaps we need to present geography in a more human way. The publishers say that people, as a rule, are not interested in the imports and exports of raw cotton and kangaroo tails.

The book may help to popularize geography and the author's point of view that we are all fellow-passengers on the same planet, all of us equally responsibe for the happiness and well-being of the world is worth emphasizing. That is what many geography teachers have been trying to do for the last twenty years.

C. E. COOPER

*Ohio University*
*Athens, Ohio*

Thomas H. Hughes. **A New Geography Series. Complete Physical Geography.** 216 pp. 12 maps in color, many charts, and half-tone relief maps of the continents. **Complete Industrial Geography.** 251 pp. 16 large maps and charts with many illustrations. **Complete Commercial Geography.** 251 pp. 17 large maps, many illustrations. Hinds, Hayden and Eldredge, N.Y. 1932.

To the reviewer the books appear, in many respects, to be an attempt to present some "good, old-fashioned geography in the good, old-fashioned way"; yet the author recognizes the modern field of the subject as shown by the definitions he gives. While the books have much to commend them, adverse criticism, it seems, should be pointed especially to the fact that there is an inexcusable lack of good physical maps; that the author stresses much too prominently the significance of the Great Zones; that in too many parts facts of human activity are given without an attempt to use these facts geographically by showing the part played by natural environment, and, in too many other parts he gives facts of nature without stressing human activity.

The books are attractively covered and illustrated. Their size, 6" x 8½", makes them convenient. Schools in which time is lacking for mastery of bulky books on Physiography, Industrial and Commercial Geography should welcome these books because of their brevity. However, the reviewer is of the opinion that to achieve brevity the author has sacrificed much. This is especially noticeable in Complete Physical Geography. In that book, probably for convenience's sake, climates are organized on the basis of the Great Zones, a simple but obsolete, because faulty, basis for climate. The chapter on the Great Zones might then have been left out without appreciably lowering the utility of the book.

In many cases statements are made to which the reviewer objects. Here are some of them: "The earth consists then, of a thin, cooled and solid crust surrounding a solid, heated interior which is able to resume its liquid form." "A glacier is a mass of ice, formed from the snow above the snowline, that moves slowly toward sea level through the action of gravity." "Some believe that meteorites are thrown into space from the moon's volcanoes." "There are 360 meridians." "We know that in the north middle latitude the seasons are four." "Corn needs plenty of rain." (Is not the same true of cacti and greosewood?) There is a chapter headed: "Controlling the Ocean." Another weakness of the book on Physical Geography is the brief treatment of erosion. Of the 216 pages, only seven or eight apply to that topic.

The volume on Commercial Geography is indeed packed with good information. In that volume the lack of geographic application is especially noticeable. However, the Industrial Geography does much better. It is full of good facts and the facts are shown to be related to the natural complex. In the reviewer's opinion this is the best book of the three and worthy of commendation.

WILLIAM J. BERRY

*Western State Teachers College*
*Kalamazoo, Michigan*

## E. G. Woods. **The Baltic Region, a Study in Physical and Human Geography.** 434 pages, 89 illustrations (by K. C. Thomson) and 54 maps and diagrams. E. P. Dutton and Co. Inc. N.Y. 1932. $5.50.

This volume consists of four parts. Part I is entitled "General Account" and consists of five chapters, while Parts II, III and IV treat of the larger subdivisions: Baltic Fenno-Scandia, the Dano-German section and the South East Baltic States, comprising fifteen chapters more. As would perhaps be suspected, in view of the English authorship of the book, Part I first defines the Baltic region, discusses its climates and presents in brief outline the main events and movements of its human history; it also contains an extended account of the hydrography of the Baltic and of Bothnia and discusses the geological provinces of the entire region under consideration. The three regions which form the basis for the remaining three parts of the book are considered in a somewhat stereotyped fashion (this expression not being used in an opprobrious sense) the opening chapters in each bearing such titles as "pre-Quarternary"

or "Quarternary geology," followed by chapters on orographical features and finally a presentation of what are called "special regions" which in the terminology of this country would qualify as "type regions." Included in the book are a number of excellent maps, usually adequate if one is also following a large-scale atlas map, and 89 pen and ink drawings by K. C. Thomson, which cleverly and often adequately portray scenes ranging from "a street cleaner of Lahti" to "cliffs of morainic material at Rauschen." The book indicates that the author is competent in geological field study and skillful in the presentation of this material, that she is intimately familiar with the Baltic region and that she has given the most careful consideration to its literature. A lengthy bibliography includes titles in many languages and frequent references to it indicate that its addition to the volume was not merely a perfunctory procedure. After studying the treatise, one is justified in concluding that this is a scholarly piece of work. Unfortunately for the majority of American geographers, however, only a small portion of the book will prove to be enlightening and useful. This majority will be inclined to regard the sub-title of the book as something of a misnomer, and will deplore so great emphasis upon purely geological matters by an author who has apparently aimed at a geographical study and who would be presumably competent to interpret the region in more familiar terms. It can scarcely be used as a textbook, but selected portions, particularly those on urban geography, may well be assigned with profit. As explained in the preface no attempt has been made to preserve a balanced treatment of the whole region, greater emphasis having been placed on sections not well treated in existing literature. This would seem to be a commendable policy for a book not intended as a text. This lack of balance is well illustrated in Chapter 20 where, in discussing Estonia, three physical subdivisions are recognized at the outset and within the first of these there are four minor divisions, the discussion of the first of these four extending thru eight of the following pages. The pen and ink sketches used in preference to photographs would seem to have varying educational value. While all are done with more than ordinary skill, those of street scenes and types of architecture seem to be fully as acceptable as excellent photographs but many of the landscapes are not as effective as a reasonably good photograph.

RALPH H. BROWN

*University of Minnesota*

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**Notes on a Journey up the Valley of the Rio Doce, Brazil**..... .....**By Preston E. James** 98

Dr. James is an associate professor of geography at the University of Michigan. During 1930-1931 he spent a sabbatical leave in carrying on a field study of southeastern Brazil. On his return he visited other parts of South America. His field work was financed in part by grants-in-aid from the National Research Council and from the University of Michigan. Several papers on southeastern Brazil are now being published, one of which has already appeared: The Coffee Lands of Southeastern Brazil, in the *Geographical Review.*

This is the twenty-seventh article in our HUMAN GEOGRAPHY SERIES.

**Exhibits of Geography Work. By Edna E. Eisen** ..... 108

Miss Eisen is a teacher of geography in Steuben Junior High School, Milwaukee, Wisconsin. Geography Field Work with Junior High School Pupils was published in the JOURNAL, February, 1931, and Maps and Grafs as Tools in Teaching Geography, in *School Science and Mathematics.* This is article number twenty in our HOW TO TEACH IT series.

**Geography in Detroit Senior High Schools. By Charles C. Barnes**.. 114

Mr. Barnes is Assistant Director and Head of the Social Science Department of the Detroit Public Schools, and an instructor in Detroit Teachers College. He is joint editor of Beck's, The Constitution of the United States for Schools, and a frequent contributor to the literature of his chosen field.

**Two Aspects of Hawaii. By O. D. von Engeln** ..... 119

Dr. von Engeln of Cornell University presents this month the fifth article in our series of TRAVEL SKETCHES.

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Miss Hoffman is a graduate of the State Normal School, Ellensburg, Washington, and a fourth grade teacher in the public schools of Outlook, Washington. She is author of "Not Methods, but Results," and of numerous magazine articles. She presents here the twenty-first in our HOW TO TEACH IT series.

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